

We claim:

1. A method for providing a logical router within a physical router, the method comprising:
  - 5 creating at least one logical router (LR) on the physical router;
  - allocating a plurality of router elements within the physical router to the at least one LR; and
  - configuring the plurality of the router elements within the LR.
- 10 2. The method of claim 1, wherein allocating a plurality of router elements includes assigning a slot address to the at least one LR.
3. The method of claim 1, wherein allocating a plurality of router elements includes assigning a router element identifier to the at least one LR.
- 15 4. The method of claim 1, wherein the router element is a distributed route processor.
5. The method of claim 1, wherein the router element is a line card.
- 20 6. The method of claim 1, wherein the router element is a Route Processor.
7. The method of claim 1, wherein the router element is only allocated to one LR at a particular time.
- 25 8. A method for allocating a router element to an LR, the method comprising:
  - detecting the addition of a router element into a slot of a physical router;
  - determining if the router element is allocated to a LR configured on the physical router; and

if the router element is allocated to the LR, then attaching the router element to an LR plane associated with the LR and if the router element is not allocated to the LR then assigning the router element to a free pool of router elements.

- 5     9.     The method of claim 8, wherein assigning the router element to the free pool of route elements comprises assigning the router element to a primary LR.
- 10    10.   The method of claim 8, further comprising sending a boot image to the router element.
11.   The method of claim 8, wherein the router element is a distributed route processor.
12.   The method of claim 8, wherein the router element is a line card.
13.   A router comprising:
  - 15    at least one rack having slots capable of receiving a plurality of router elements;
  - at least one route processor coupled to the at least one rack and operable to maintain configuration information for the at least one rack; and
  - at least one logical router defined by the configuration information, wherein a subset of the plurality of router elements may be allocated using the configuration information to the
  - 20    at least one logical router.
14.   The router of claim 13, wherein the router elements include a line card.
15.   The router of claim 13, wherein the router elements include a distributed route processor.
- 25    16.   The router of claim 13, wherein the router elements include a router infrastructure servicer.

17. A router comprising:
  - means for creating at least one LR on the physical router;
  - means for allocating a plurality of router elements within the physical router to at least one LR; and
- 5 means for configuring the plurality of the router elements within the LR.
18. The router claim 17, wherein the means for allocating a plurality of router elements includes means for assigning a slot address to the at least one LR.
- 10 19. The router of claim 17, wherein the means for allocating a plurality of router elements includes means for assigning a router element identifier to the at least one LR.
20. The router of claim 17, wherein the router element is a distributed route processor.
- 15 21. The router of claim 17, wherein the router element is a line card.
22. A computer-readable medium having computer-executable instructions for providing a logical router (LR) within a physical router, the method comprising:
  - creating at least one LR on the physical router;
- 20 allocating a plurality of router elements within the physical router to the at least one LR; and
- configuring the plurality of the router elements within the at least one LR.
23. The computer-readable medium of claim 22, wherein allocating a plurality of router elements includes assigning a slot address to the at least one LR.
- 25 24. The computer-readable medium of claim 22, wherein allocating a plurality of router elements includes assigning a router element identifier to the at least one LR.

25. The computer-readable medium of claim 22, wherein the router element is a distributed route processor.

26. The computer-readable medium of claim 22, wherein the router element is a line card.

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27. The computer-readable medium of claim 22, wherein the router element is only allocated to one LR at a particular time.

28. A computer-readable medium having computer executable instructions for performing a method for allocating a router element to a virtual private router, the method comprising:

10        detecting the addition of a router element into a slot of a physical router;

      determining if the router element is allocated to an LR configured on the physical router; and

15        if the router element is allocated to the LR, then registering the router element with a master router element associated with the LR and if the router element is not allocated to a LR then assigning the router element to a default LR.

29. The computer-readable medium of claim 28, wherein the default LR comprises an owner LR.

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30. The computer-readable medium of claim 28, further comprising sending a boot image to the router element.

31. The computer-readable medium of claim 28, wherein the router element is a distributed route processor.

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32. The computer-readable medium of claim 28, wherein the router element is a line card.

33. A computerized method for configuring a logical router (LR) within a physical router, the method comprising:

- selecting a LR on the physical router;
- allocating a plurality of router elements within the physical router to the at least one LR; and

configuring the plurality of the router elements within the at least one LR.

34. The computerized method of claim 33, wherein selecting the LR comprises selecting a default LR

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35. The computerized method of claim 33, wherein allocating a plurality of router elements includes assigning a slot address to the at least one LR.

36. The computerized method of claim 33, wherein allocating a plurality of router elements includes assigning a router element identifier to the at least one LR.

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37. The computerized method of claim 33, wherein the router element is a distributed route processor.

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38. The computerized method of claim 33, wherein the router element is a line card.

39. A computer-readable medium having computer-executable instructions for providing a logical router (LR) within a physical router, the method comprising:

- selecting a LR on the physical router;
- allocating a plurality of router elements within the physical router to the at least one LR; and

configuring the plurality of the router elements within the at least one LR.

40. . The computer-readable medium of claim 39, wherein selecting the LR comprises selecting a default LR.

41. The computer-readable medium of claim 39, wherein allocating a plurality of router  
5 elements includes assigning a slot address to the at least one LR.

42. The computer-readable medium of claim 39, wherein allocating a plurality of router elements includes assigning a router element identifier to the at least one LR.

10 43. The computer-readable medium of claim 39, wherein the router element is a distributed route processor.

44. The computer-readable medium of claim 39, wherein the router element is a line card.